IN THE CLAIMS:

1. (Original) An isolated nucleic acid comprising a nucleotide sequence encoding a mutated human synuclein protein or homologue thereof.

2. (Original) The isolated nucleic acid of claim 1 wherein said mutated synuclein protein is selected from the group consisting of alpha, beta and gamma synuclein proteins.

3. (Original) The isolated nucleic acid of claim 2 wherein said mutated synuclein protein is the alpha synuclein protein.

4. (Original) The isolated nucleic acid of claim 3 wherein said nucleotide sequence contains at least one mutation at base pair position 209.

5. (Presently amended) ~~The~~An isolated nucleic acid comprising a nucleotide sequence encoding a mutated human alpha synuclein protein ~~of claim 4 wherein said~~ having a mutation at position 209 ~~is a change from~~ wherein a guanine ~~to~~ is replaced by an adenine.

6. (Presently amended) ~~The~~An isolated nucleic acid ~~of claim 5 having~~ comprising the sequence given in SEQ ID NO. 1.

7-9. (Cancelled)

10. (Currently amended) A vector comprising the isolated nucleic acid of claim ~~1~~5.

11. (Original) A host cell comprising the vector of claim 10.

12-23. (Cancelled).

24. (Currently amended) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids~~, proteins or tissues~~ from the subjects; and

detecting in the nucleic acids~~, proteins or tissues~~ the presence of ~~a mutation~~ an adenine at base pair position 209 in the alpha synuclein gene ~~which is associated with Parkinson's disease~~,

thereby identifying subjects at increased risk for the disease.

25. (Withdrawn) The method of claim 24 wherein said mutation is located on human chromosome four.

26. (Withdrawn) The method of claim 25 wherein said mutation is located in the alpha synuclein gene.

27. (Withdrawn) The method of claim 26 wherein said mutation causes an amino acid substitution at position 53.

28. (Withdrawn) The method of claim 27 wherein said mutation causes an alanine to threonine substitution at position 53.

29. (Withdrawn) The method of claim 24 wherein said detecting step comprises combining a nucleotide probe which selectively hybridizes to a nucleic acid containing said mutation, and detecting the presence of hybridization.

30. (Withdrawn) The method of claim 29 wherein said nucleotide probe is an oligonucleotide complementary to a portion of the synuclein gene, wherein said portion comprises a mutation associated with predisposition to Parkinson's Disease.

31-32. (Cancelled)

33. (Withdrawn) The method of claim 24 wherein said detecting step comprises amplifying a nucleic acid product comprising said mutation, and detecting the presence of said mutation in the amplified product.

34. (Withdrawn) The method of claim 33 wherein said detecting step comprises selectively amplifying a nucleic acid product comprising said mutation, and detecting the presence of amplification.

35. (Withdrawn) The method of claim 34 wherein said amplifying step comprises at least one annealing step whereby at least one oligonucleotide is annealed to said sample of nucleic acids.

36. (Withdrawn) The method of claim 35 wherein said amplifying step uses two oligonucleotides.

37. (Withdrawn) The method of claim 36 wherein said two oligonucleotides have the sequences of SEQ ID NOs 2 and 3.

38. (Withdrawn) The method of claim 24 wherein said detecting step comprises detecting the presence or absence of a restriction endonuclease site as detected by enzymatic digest of said sample of nucleic acids.

39. (Withdrawn) The method of claim 38 wherein said restriction endonuclease site is recognized by *Tsp*451.

40. (Withdrawn) The method of claim 24 wherein said detecting step comprises chain termination with a labeled dideoxynucleotide.

41-43. (Cancelled)

44. (Withdrawn) The method of claim 24 wherein said detection step comprises identification of said mutations with an antibody.

45. (Withdrawn) The method of claim 44 wherein said antibody is directed against an isolated human synuclein protein or peptide containing at least one mutation.

46. (Withdrawn) The method of claim 45 wherein said isolated human synuclein protein or peptide is selected from a group consisting of the human alpha, beta, and gamma synuclein proteins or fragments thereof.

47. (Withdrawn) The method of claim 46 wherein said isolated human synuclein protein or peptide has the mutated sequence given in SEQ ID NO 5.

48. (Withdrawn) The method of claim 47 wherein said mutation is at amino acid position 53.

49. (Withdrawn) The method of claim 48 wherein said mutation is an alanine to threonine substition

50-56. (Cancelled)

57. (Currently amended) An isolated nucleic acid comprising a mutation in an alpha human synuclein gene wherein a guanine is replaced by an alanine at base pair position 209~~or homologue thereof~~.

58-60. (Cancelled)

61. (Currently amended) The isolated nucleic acid of claim ~~60~~57 having the sequence given in SEQ ID NO 1.

62-74. (Cancelled)

75. (New) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids from the subjects; and

detecting in the nucleic acids the presence of the nucleic acid of claim 5,

thereby identifying subjects at increased risk for Parkinson's Disease.

76. (New) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids from the subjects; and

detecting in the nucleic acids the presence of the nucleic acid of claim 6,

thereby identifying subjects at increased risk for Parkinson's Disease.